

DOOSAN Document Transmittal

Date

DT No.:

SHEET
1 OF 1

Upper Trishuli-1 HEP (216MW)

2022-07-28

UT1-HEP-DHI-PC-D-0049

DOOSAN NEPAL
BRANCH OFFICEAddress & Contact No. :
Four Square Building, Naxal,
Kathmandu, Nepal (P.O Box : 1387)
+ 977 1 692 3014Project No.
H20002

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SUBJECT

Submission of Review Note RN-0200, RN-0201 and RN-0202

S. N.	REVIEW NOTE NO.	REVIEW STATUS	DWG. / DOC. NO.	REV.	DWG. TITLE / DOC. DESCRIPTION	REMARK
1	RN-0200	RR	UT1-C-020-CVL-TE-40012	0C	Physical Hydraulic Model Test Study Report of Weir and Dam	
2	RN-0201	AN	UT1-C-080-CVL-DG-59001	0C	Excavation and support drawing of Tailrace Outlet Gate Chamber	
3	RN-0202	AN	UT1-C-150-CVL-OT-54001	0	Technical Requirements for water pressure test of headrace tunnel	
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Legend of Review Status

A : APPROVED

AN : APPROVED AS NOTED

RR : RETURN FOR RESUBMISSION

FI : FOR INFORMATION

DHI STAMP



Issued by DHI

Youngsoo Son

Project Manager

Discipline : Civil

Email: youngsoo.son@doosan.com
Doosan Enerbility Co., Ltd.

UPPER TRISHULI-1 HEP (216MW)

Client	Nepal Water and Energy Development Company Private Limited		
Owner’s Engineer	Tractebel Engineering GmbH / Jade Consult		
REVIEW NOTE			
Contractor	Doosan Enerbility		
Title of the Document	Technical Requirements for water pressure test of headrace tunnel		
Document No.	UT1-C-150-CVL-OT-54001	Revision	0
Date of Documents	24.07.2022	Received Date	25.07.2022
Transmittal Form No.	UT1-HEP-DHI-D-0315		
Previous Review Date/Status	FI	Prev. Review Note No.	N/A
Review Note No.	RN-0202	Present Review Date	28.07.2022
		Present Review Status	AN

A: Approved AN: Approved as Noted RR: Returned for Resubmission FI: For Information, only

General Comments

1. Purpose of Test

According to the requirements of the owner's engineer (OE), the water pressure test needs to be carried out in order to find out the water permeability of each type of surrounding rock in the headrace tunnel, obtain the permeability coefficients (K) of different surrounding rocks, and provide a basis for the design of the tunnel lining.

- According to the document (UT1-C-150-CVL-OT-54001) entitled "Technical Requirements for water pressure test of headrace tunnel", the Contractor has mentioned that it is the requirements of the Owner's engineer (OE). In the contrary, the OE has not requested or recommended such tests. All tests to be carried by the EPC contractor shall comply with the contractual terms and conditions.

2. Work Scope

1. In accordance with the requirements of the "Specification for Water Pressure Test in Borehole of Hydropower Project" (NBT35113-2018), the conventional water pressure test is carried out.

- Since the proposed conventional water pressure test is based on "Specification for Water Pressure Test in Borehole of Hydropower Project" (NBT35113-2018), the Contractor should provide this document to the OE.
- Generally, water pressure tests is carried out to identify the joint density, rock-mass condition, hydraulic conductivity in the rock mass etc. The test is particularly important in weak rock, highly fractured and jointed sections (e.g. fault zone). The results obtained shall enable the designer to adjust support in lined and unlined sections. Additionally, the test results obtained are required to apply the correct pressure during grouting.

- To obtain reliable information about groundwater conditions, piezometer data, hydro-fracture test data, internal groundwater pressure shall be collected on a frequent basis for design consideration. However, there is no clear objective and justification of how the Contractor will utilize the water pressure test data itemized in subject MS in the design and support process/selection.

3. Location of Test

To select suitable location in the headrace tunnel to carry out the water pressure test.

(1) For rock class I, II and III to select suitable location to carry out the water pressure test, 3 holes for each rock class.

(2) For rock class IV and V, every 100 meter should carry out 1 hole for test, the location of hole can be adjusted reasonably according to the distribution of surrounding rock on site.

- The water pressure test is important to be conducted in the classes III, IV and V (weak rock-mass conditions), wide open joints with high ingress of groundwater flow. Other factors are hydrostatic pore water pressure, overburden, stress, measurement of groundwater flow. What are the criteria of selecting locations for the tests and how will it support the design?

4. Test Method

1. Each test section is 5 meters and the drilling depth is 15 meters for each hole.

2. Water pressure test is performed according to the test specification of three pressure levels and five stages, i.e.

(1) The test pressure for class I, II and III is performed according to three pressure levels of 0.2MPa, 0.4MPa and 0.6MPa and five stages, i.e. 0.2MPa → 0.4MPa → 0.6MPa → 0.4MPa → 0.2MPa five stages.

(2) The test pressure for class IV and V is performed according to three pressure levels of 0.2MPa, 0.3MPa and 0.5MPa and five stages, i.e. 0.2MPa → 0.3MPa → 0.5MPa → 0.3MPa → 0.2MPa five stages.

- High ingress of groundwater flow is evidently seen currently in the Headrace tunnel (HRT), but the internal groundwater pressure is unknown (no measurement till now). Being this a precondition, what is the justification of selecting the pressure levels as proposed by the Contractor in the test method?. Why no higher pressure levels are selected? What are the criteria for selecting pressure levels in different locations?
- The letter *OE-TJ-UT1-OUT Site-DHI 272 "HRT Design; Contractual Requirements"*, dated 22.07.2022, shall be respected.

Disclaimer:

Any approval will not release the Contractor from any of his obligations under the Contract. Despite the Engineer's approval the Contractor remains fully responsible for design, calculation, dimensioning, supply and installation without limitations.



Sebastian Beck, Chief Design Engineer